

Award Number: W81XWH-12-2-0018

**TITLE:** NRC/AMRMC Resident Research Associateship Program

**PRINCIPAL INVESTIGATOR:** Howard Gamble

**CONTRACTING ORGANIZATION:** NATIONAL ACADEMY OF SCIENCES  
Washington, DC 20001

**REPORT DATE:** April 2017

**TYPE OF REPORT:** Annual

**PREPARED FOR:** U.S. Army Medical Research and Materiel Command  
Fort Detrick, Maryland 21702-5012

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# REPORT DOCUMENTATION PAGE

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<b>1. REPORT DATE</b> April 2017		<b>2. REPORT TYPE</b> Annual		<b>3. DATES COVERED</b> 15 Mar 2016 - 14 Mar 2017	
<b>4. TITLE AND SUBTITLE</b> NRC/AMRMC Resident Research Associateship Program				<b>5a. CONTRACT NUMBER</b>	
				<b>5b. GRANT NUMBER</b> W81XWH-12-2-0018	
				<b>5c. PROGRAM ELEMENT NUMBER</b>	
<b>6. AUTHOR(S)</b> Howard Gamble				<b>5d. PROJECT NUMBER</b>	
Email: RGamble@nas.edu				<b>5e. TASK NUMBER</b>	
				<b>5f. WORK UNIT NUMBER</b>	
<b>7. PERFORMING ORGANIZATION NAME(S) AND ADDRESS(ES)</b> National Academy of Sciences 500 5 <sup>th</sup> Street, N.W. Washington, DC 20001				<b>8. PERFORMING ORGANIZATION REPORT NUMBER</b>	
<b>9. SPONSORING / MONITORING AGENCY NAME(S) AND ADDRESS(ES)</b> U.S. Army Medical Research and Materiel Command Fort Detrick, Maryland 21702-5012				<b>10. SPONSOR/MONITOR'S ACRONYM(S)</b>	
				<b>11. SPONSOR/MONITOR'S REPORT NUMBER(S)</b>	
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<b>13. SUPPLEMENTARY NOTES</b> This same report is submitted for contracts W81XWH-12-2-0010; W81XWH-12-2-0015; W81XWH-12-2-003; and W81XWH-12-2-0033					
<b>14. ABSTRACT</b> During this reporting period, the NRC promoted research opportunities at AMRMC institutes through a broad outreach plan. A total of 12 applications were received during the period and of these, 10 were reviewed by NRC panels. 8 awards were offered and all 8 were accepted. A total of 13 Associates ended their tenure during the reporting period and of these 9 submitted a final report. The productivity of these Associates is listed in the technical report.					
<b>15. SUBJECT TERMS-</b> Associateship program, post-doc, awards					
<b>16. SECURITY CLASSIFICATION OF:</b>			<b>17. LIMITATION OF ABSTRACT</b> UU	<b>18. NUMBER OF PAGES</b> 20	<b>19a. NAME OF RESPONSIBLE PERSON</b> USAMRMC
<b>a. REPORT</b> U	<b>b. ABSTRACT</b> U	<b>c. THIS PAGE</b> U			<b>19b. TELEPHONE NUMBER</b> (include area code)

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**SCIENCES • ENGINEERING • MEDICINE**  
**RESEARCH ASSOCIATESHIP PROGRAM**  
**with**  
**U.S. Army Medical Research Institute of Infectious Diseases**  
**U.S. Army Medical Research & Materiel Command**

**Annual Contract Technical Report**

Contract No. W81XWH-12-2-0018  
Contract Period: 03/15/2012-02/28/2018  
Report Period: 05/01/2016-04/30/2017

During the reporting period, the National Academies of Sciences, Engineering, and Medicine (the Academies) NRC conducted the following activities in support of the subject contract:

## **Outreach and Promotion**

The promotional schedule to advertise the NRC Research Associateship Programs included the following: 1) attendance at meetings of major scientific and engineering professional societies; 2) advertising in programs and career centers for these and other professional society meetings; 3) direct mailing and emailing of announcements and program materials to presidents, graduate deans, and heads of appropriate science and engineering departments and minority-affairs offices of all academic degree-granting institutions in the United States; 4) posting announcements on internet job sites, electronic newsletters and professional society websites; 5) print advertising in high profile publications (e.g., Science magazine, the Chronicle of Higher Education); and, 6) maintaining a presence on social media sites such as Facebook.

The Academies attended a number of minority focused events in which we maintained exhibit booths, participated in workshops and advertised in meeting literature, newsletters and websites or submitted materials for distribution. In addition, ads were placed in a variety of minority publications (e.g., Affirmative Action, Black Collegian).

In advertising the Research Opportunities available to prospective applicants, the Academies maintained an up-to-date listing of all active Research Advisers, current Adviser contact information and details of each Research Opportunity.

## **Processing and Review of Applications**

Applications to the Research Associateship Programs were submitted via a web-based application system. Each application cycle opened two months prior to the application deadline. Academies staff provided support to prospective applicants including providing application instructions, technical support and additional information as requested.

A summary of applications for the reporting period is shown in Table 1.

For each applicant, the Academies received and processed an application form, a research proposal, transcripts, a statement of previous and current research, and confidential reference reports. An application file check was made prior to the review and each applicant was notified if required documents were missing.

The Academies convened panels in five broad discipline areas for the competitive review of applications in the NRC Research Associateship Programs. Results of the review were made available to Laboratory Program Representatives immediately following the conclusion of the each review.

A summary of the outcome of the review of applications for the reporting period is shown in Table 1.

## **Administration of Awards**

The Academies made awards to applicants based on sponsor authorization. A summary of awards authorized and the acceptance or declination by the applicant during the current reporting period is shown in Table 1.

For NRC Research Associates beginning or continuing tenure, the Academies provided the administrative functions described in the contract Statement of Work. These functions included stipend payments,

management of a major medical benefits insurance program, and reimbursement for relocation and travel to professional meetings.

A summary of NRC Research Associates on tenure during the reporting period is shown in Table 2.

## **Outcomes Reporting**

All NRC Research Associates who completed tenure were required to submit a final report that described the outcome of their Research Associateship award. Final reports received by the Academies during the current reporting period are attached to this technical report.

The activities of NRC Research Associates submitting final reports during this reporting period, including publications, presentations and patents, as well as an assessment of their experience in the program, are summarized in Table 3. Specific accomplishments of NRC Research Associates completing tenure during the reporting period are summarized in individual Final Reports (attached).

**Table 1.** Summary of applications and awards

**Table 2.** NRC Research Associates on tenure during the reporting period

**Table 3.** Activities of NRC Research Associates who completed tenure during the reporting period

**Attachments:** NRC Research Associates Final Reports, including Research Accomplishments and Scholarly Productivity

## U.S. Army Medical Research & Materiel Command

**Table 1: Summary of applications and awards**

	May 2016	Aug 2016	Nov 2016	Feb 2017	Total
TOTAL APPLICATIONS	6	3	4	4	17
Applications not reviewed	0	0	0	1	1
Applications reviewed	6	3	4	3	16
Not recommended	0	0	0	0	0
Recommended	6	3	4	3	16
Withdrawn	0	0	0	0	0
Lab decision pending	0	0	0	1	1
Awards offered	6	3	4	2	15
Applicant decision pending	0	1	0	0	1
Awards accepted	5	2	4	2	13
Awards declined	1	0	0	0	1
Not funded	0	0	0	0	0

**Table 2: NRC Research Associates on tenure during the reporting period**

Associate	Adviser	Tenure Dates	Final Report
<b>U.S. Army Institute of Surgical Research</b>			
Cheppudira, Bopiah Pooviah	Christy, Robert John	9/4/2012-9/3/2017	
Greene, Whitney Ann	Wang, Heuy-Ching H.	4/25/2012-7/24/2017	
Holt, Andrew Whyte	Wang, Heuy-Ching H.	2/13/2017-2/12/2018	
Karna, Sai Lakshmi Rajasekhar	Leung, Kai P	4/1/2013-4/13/2017	Received
Nguyen, Jesse Quoc	Leung, Kai P	3/1/2017-2/28/2018	
Olekson, Melissa Ann	Leung, Kai P	9/2/2014-9/1/2016	Received
Parida, Bijaya Kumar	Dubick, Michael A.	3/19/2012-9/18/2016	Received
Penn, Alexander Hayes	Torres Filho, Ivo P	1/14/2015-5/14/2017	
Sosanya, Natasha	Christy, Robert John	4/20/2015-2/28/2018	
<b>U.S. Army Medical Research Institute of Chemical Defense</b>			
Beske, Phillip Howard	McNutt, Patrick Michael	8/29/2013-5/16/2017	
<b>U.S. Army Medical Research Institute of Infectious Diseases</b>			
Bachert, Beth Alexandra	Bozue, Joel A	1/3/2017-1/2/2018	
Bixler, Sandra Lynn	Goff, Arthur James	8/18/2014-11/25/2016	Received
Coate, Eric Allan	Bozue, Joel A	12/30/2015-12/29/2017	
Cohen, Courtney Alicia	Glass, Pamela J	7/28/2014-7/31/2016	Received
DeLaine-Elias, Breonna C.	Palacios, Gustavo F	3/1/2017-2/28/2018	
Duy, Janice	Minogue, Timothy Devins	8/1/2013-7/31/2017	
Hollidge, Bradley Sherman	Schmaljohn, Connie	5/2/2016-2/28/2018	
Huse, Valerie	Minogue, Timothy Devins	9/29/2014-7/29/2016	Received
Kohler, Lara Juliette	Cote, Christopher Kevin	1/17/2017-1/16/2018	
Krishnamurthy, Malathy	Panchal, Rekha G.	10/5/2015-10/4/2017	
Maxson, Tucker	Minogue, Timothy Devins	2/1/2017-1/31/2018	
Mielech, Anna Maria	Ulrich, Robert Glenn	2/2/2016-2/1/2018	
Ricks, Keersten Michelle	Schoepp, Randal J.	12/7/2015-12/6/2017	
Shoemaker, Charles Jason	Schmaljohn, Connie	2/3/2014-2/2/2017	Received
Smith, Jessica L	Ulrich, Robert Glenn	6/24/2013-2/28/2018	
Stefan, Christopher Patrick	Minogue, Timothy Devins	1/2/2014-1/1/2018	
Stojadinovic, Marija	Panchal, Rekha G.	12/1/2014-11/30/2017	
Tursiella, Melissa Lynne	Schmaljohn, Connie	4/1/2014-1/31/2018	
Zeng, Xiankun	Sun, Mei Guo	5/4/2015-7/31/2016	Received
<b>Walter Reed Army Institute of Research, Silver Spring</b>			
Anderson, Margery Diane	Yourick, Debra Lynn	3/11/2014-2/28/2018	
Barasa, Sheila Ogoma	Mancuso, James D	5/5/2015-2/28/2018	
Brager, Allison J	Capaldi, Vincent F	7/18/2016-3/13/2017	Received
Crivat, Georgeta	Angov, Evelina	5/16/2016-11/15/2017	
DeDominicis, Kristen Elizabeth	Boutte, Angela M	9/8/2015-3/31/2017	Received
Kobylinski, Kevin Conrad	Davidson, Silas Andrew	10/17/2011-4/16/2017	Received
Kuehn, Emily Denise	Yourick, Debra Lynn	11/14/2016-11/13/2017	
Linton, Yvonne-Marie	Clark, Jeffrey William	10/3/2011-10/2/2016	Not Rec'd
Margulieux, Katie Rose	Swierczewski, Brett Edward	8/4/2016-8/3/2017	
McCracken, Michael Kevin	Jarman, Richard George	3/9/2015-2/28/2018	
McDermott, Emily Gray	Garver, Lindsey Susannah	1/9/2017-1/8/2018	
Pollett, Simon	Jarman, Richard George	6/27/2016-6/26/2017	
Simonelli, Guido	Capaldi, Vincent F	10/6/2014-10/5/2017	
Tenenbaum, Laura Subbiah	Yourick, Debra Lynn	6/3/2013-6/2/2017	
Zarling, Stasya Nicole	Krzych, Urszula	2/7/2011-5/15/2016	Received

**Table 3: Activities of NRC Research Associates who completed tenure during the reporting period**

- 13** Associates ended tenure during the report period
- 35** months was the average tenure length
- 66** months was the longest
- 8** months was the shortest
- 12** submitted final reports

In the final reports, Associates indicated the following scholarly activity while on tenure.

- 62** Articles published in refereed journals
- 16** Articles other (Proceedings, Book Chapters, other)
- 41** Domestic presentations
- 15** International presentations
- 0** Patent applications
- 9** Awards

After ending their tenure, Associates indicated their future plans as follows:

- 0** Permanent position at the NRC host agency
- 8** Contract or temporary position at the NRC host agency
- 1** Research/administrative position with another U.S. government agency
- 0** Research/administrative position with foreign government agency
- 0** Research/teaching at US college/university
- 0** Research/teaching position at a foreign college or university
- 0** Research/administrative position in private industry in the U.S.
- 0** Research/administrative position in private industry outside of the U.S.
- 1** Research/administrative position with a non-profit
- 0** Self-employed/consulting
- 0** Postdoctoral Research
- 1** Other
- 1** No information provided

In their final reports, Associates were asked to evaluate certain aspects of their experiences on a scale of 1 (low) to 10 (high). The average rating for each item follows:

- 9.8** Short-term value (lab)-Development of knowledge, skills, and research productivity at lab
- 9.7** Long-term value (career)-How your Research Associateship affected your career to date
- 9.7** Laboratory Support-Equipment, funding, orientation, safety & health training, etc.
- 9.4** Adviser Mentoring-Quality of mentoring from the Research Adviser
- 9.5** LPR Support-Quality of administrative support from the LPR
- 9.9** NRC Support-Quality of administrative support from the NRC

**Attachments**

Associates Final Reports, including Research Accomplishments and Scholarly Productivity, follow.

## NRC RESEARCH ASSOCIATESHIP PROGRAM ASSOCIATE FINAL REPORT

**Associate:** Bixler, Sandra Lynn  
**Program:** AMRMC - U.S. Army Medical Research & Materiel Command  
U.S. Army Medical Research Institute of Infectious Diseases  
US Army Medical Research Insti Infec Diseases  
Fort Detrick, MD 21702-5011  
**Opportunity:** B7689/Animal Modeling and Therapeutic Development for Category A Agents  
**Adviser:** Goff, Arthur James  
**Research Proposal:** Characterizing the Dynamics, Phenotype, and Functionality of Immune Responses to Filovirus Infection  
**Tenure Dates:** 08/18/2014-11/25/2016

### RESEARCH ACCOMPLISHMENTS

My postdoctoral research has focused on immune responses to filovirus infection using the nonhuman primate model. My research has identified a novel potential mechanism for the unusual pathology observed following vaccination and subsequent aerosol challenge with filoviruses. My work with the aerosol challenge model has also led to a focus on mucosal routes of exposure to filoviruses and the unique immune responses generated from these routes. I conducted several animal model studies aimed at developing a low-dose mucosal exposure model in primates that would more accurately reflect the filovirus disease course observed in humans. This included the development of two intranasal exposure models which are being implemented in the testing and evaluation of medical countermeasures.

### SCHOLARLY PRODUCTIVITY

#### ARTICLES - PEER REVIEWED

Bixler, Sandra L; Bearss, Jeremy J.; Shamblin, Joshua D.; Wollen, Suzanne E.; Zelko, Justine M.; Botto, Miriam A; Johnston, Sara C.; O'Hearn, Aileen E.; Olschner, Scott P.; Grimes, Elizabeth C; Schoepp, Randall J; Goff, Arthur J, 2016, Subclinical Ebola Virus Makona infection in nonhuman primates,  
Bixler, Sandra; Zeng, Xiankun; Raymond, Jo Lynne; Shamblin, Joshua D; Wollen, Suzanne E; Zelko, Justine M; Wilkinson, Eric R; Pitt, M. Louise M; Johnston, Sara C; Goff, Arthur J, 2016, No cleared for release yet,  
Bixler, Sandra L; Goff, Arthur J., 2015, The Role of Cytokines and Chemokines in Filovirus Infection, Viruses, 7(10):5489-507

#### ARTICLES - OTHER (PROCEEDINGS, BOOK CHAPTERS, OTHER)

#### PRESENTATIONS - DOMESTIC

#### PRESENTATIONS - INTERNATIONAL

#### PATENTS

#### AWARDS

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**NRC Research Associateship Programs**

**FINAL REPORT**

1) Associate Last or Family Name <b>Cohen</b>	First Name <b>Courtney</b>	M.I. <b>A</b>
2) FORWARDING Address (to which your tax statement will be mailed)  <b>Residence or Institution USAMRIID</b> Street City, State Zip	FORWARDING Phone(s) and E-Mail (if known) Home Phone: Alt. Phone: Preferred E-mail: courtney.a.cohen.ctr@mail.mil	
3) Today's Date <b>July 28, 2016</b>	Dates of Tenure from August 1, 2014 to July 31, 2016	
4) Host Agency <b>AMRMC</b> (e.g., AFRL)	Laboratory or Center <b>USAMRIID</b> (e.g., Wright Patterson AFB)	Division / Directorate / Department <b>Virology</b> (e.g., High-Speed Propulsion)
5) Name of Laboratory Adviser (and USMA Mentor, if applicable) <b>Dr. Pamela Glass</b>		

6) **TITLE OF RESEARCH PROPOSAL**

**Determining the Correlates of Protection Following Alphavirus Infection in NHP**

7) **SUMMARY OF RESEARCH DURING TENURE** Itemize significant findings in concise form, utilizing key concepts/words.

- 1) The trivalent replicon particle vaccine induces a polyfunctional, memory T cell response against VEEV, EEEV and WEEV in mice
- 2) Vaccine-induced T cell-specific epitopes within viral glycoproteins E1 and E2 were identified for VEEV, EEEV, and WEEV
- 3) Vaccine-induced T cell-specific epitopes occur within regions of homology between heterologous viruses
- 4) Subcutaneous vaccination results in vaccine-induced changes in the CNS.
- 5)

(USMA Davies Fellow: please add summary of teaching, including classes taught.)

n/a

8) **RESEARCH IN PROGRESS** Describe in no more than 100 words.

Vaccine-induced T cell responses project is wrapping up, manuscript is in progress. Additional vaccine-induced responses will continue to be evaluated if collaboration continues. Upcoming NHP study will be utilized to provide a kinetic evaluation of immune cell infiltration in the brain following aerosol infection.

9) **PUBLICATIONS AND PAPERS RESULTING FROM NRC ASSOCIATESHIP RESEARCH**

Provide complete citations: author(s), title, full name of journal, volume number, page number(s), and year of publication.

a) Publications in peer-reviewed journals

b) Books, book chapters, other publications

c) Manuscripts in preparation, manuscripts submitted

**Cohen, C.A., Prugar, L., Glass, P.M. Cell-mediated responses and T cell-specific epitopes to a replicon particle vaccine in mice. In preparation for Vaccine, December 2016.**

10) **PATENT OR COPYRIGHT APPLICATIONS RESULTING FROM NRC ASSOCIATESHIP RESEARCH**

Provide titles, inventors, and dates of applications.

**11) PRESENTATIONS AT SCIENTIFIC MEETINGS OR CONFERENCES**

Provide complete references: author(s), title, abstract/proceeding citation, meeting name and location.

**International**

**ASV Annual Meeting, London Ontario July 2015 (Oral Presentation)**

**Domestic**

**ASV Annual Meeting, Blacksburg VA. June 2016 (Oral Presentation)**

**AAI Annual Meeting, Seattle WA. May 2016 (Poster Presentation)**

**AAI Annual Meeting, New Orleans LA. (Poster Presentation)**

**12) SEMINARS OR LECTURES DELIVERED AT UNIVERSITIES AND/OR INSTITUTES** **Include dates, names and locations of seminars.**

**13) PROFESSIONAL AWARDS RECEIVED DURING TENURE**

**ASV Travel Award, American Society for Virology Annual Meeting (\$500), 2015**

**14) POST-TENURE POSITION / JOB TITLE**

**ORISE Fellow**

**15) NAME AND ADDRESS OF POST-TENURE POSITION / JOB ORGANIZATION**

**USAMRIID, 1425 Porter St. Frederick MD.**

**16) POST-TENURE POSITION STATUS / CATEGORY** **Please indicate only one.**

- Permanent position at the host agency
- Contract or temporary position at the host Agency  
Abbreviate Host Laboratory/Center MRMC
- Research/Administrative position with another U.S.-government agency
- Research/Administrative position with a foreign-government agency
- Research/teaching position at a U.S. college or university
- Research/teaching position at a foreign college or university

- Research/administration position in private industry in the U.S.
- Research/administration position in private industry outside of the U.S.
- Research/administration position with a non profit
- Self-employed/consulting
- Postdoctoral research
- Other (Please specify, possible) \_\_\_\_\_
- No information provided

**17) (For J-1 visa holders only) SUMMARY OF CULTURAL AND EDUCATIONAL EXCHANGE DURING TENURE** Itemize experiences that your laboratory (LPR and/or Adviser) has offered to you that facilitated your learning about American culture. Also itemize what you have done to share your culture with your colleagues and the community.

- 1)
- 2)
- 3)
- 4)
- 5)

**18) APPRAISAL OF NRC RESEARCH ASSOCIATESHIP PROGRAM**

**On a scale of 1 – 10 (poor - excellent), please rate the following:**

**SHORT TERM VALUE**

**7** Development of knowledge, skills, and research productivity  
**Comments**

**LONG TERM VALUE**

**10** How the NRC Research Associateship award affected your career to date  
**Comments**

**LAB SUPPORT**

**10** Quality of support from the Laboratory--equipment, funding, orientation, safety and health guidelines, etc.  
**Comments**

**ADVISER/MENTOR SUPPORT**

**10** Quality of mentoring from the Laboratory Adviser (USMA Mentor, if applicable)

## Comments

### LPR SUPPORT

7 Quality of administrative support from the Laboratory Program Representative (LPR)  
**Comments**

### NRC RESEARCH ASSOCIATESHIP PROGRAMS SUPPORT

10 Quality of administrative support. Please assess the support you received from the Fellowships Office (e.g., moving company, insurance, Omega, payroll, Program Coordinator, travel, etc.)

### **Comments**

18) PLEASE PROVIDE ANY SUGGESTIONS FOR PROGRAM IMPROVEMENT.

Due to the funding atmosphere at RIID and the length of the application process, it is common for the agreed-upon project to have evaporated by the time a postdoc is able to begin tenure. If this were communicated up front to the applicants, it may lessen frustrations.

**Please do NOT scan to PDF. Send the Final Report as MSWord document via e-mail to your Program Coordinator**

*No handwritten signature required;  
but you may upload a scanned  
signature file below:*

Leah Probst: [lprobst@nas.edu](mailto:lprobst@nas.edu)  
Linda Sligh: [lsligh@nas.edu](mailto:lsligh@nas.edu)  
Melanie Suydam: [msuydam@nas.edu](mailto:msuydam@nas.edu)  
Peggy Wilson: [pwilson@nas.edu](mailto:pwilson@nas.edu)

Id#

Rev. October 2015

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**NRC Research Associateship Programs**

**FINAL REPORT**

1) Associate Last or Family Name <b>Huse</b>		First Name <b>Valerie</b>	M.I. <b>A</b>
2) FORWARDING Address (to which your tax statement will be mailed)  Residence or Institution Residence Street City, State Zip		FORWARDING Phone(s) and E-Mail (if known) Home Phone: n/a Alt. Phone: Preferred E-mail:	
3) Today's Date <b>May 18, 2016</b>		Dates of Tenure from <b>September 29, 2014</b> to <b>July 29, 2016</b>	
4) Host Agency <b>USAMRIID</b> (e.g., AFRL)	Laboratory or Center <b>AMRMC, Fort Detrick</b> (e.g., Wright Patterson AFB)	Division / Directorate / Department <b>Diagnostic Systems Division</b> (e.g., High-Speed Propulsion)	
5) Name of Laboratory Adviser (and USMA Mentor, if applicable) <b>Dr. Timothy Minogue</b>			

6) **TITLE OF RESEARCH PROPOSAL**

**Improvement of Viral Diagnostic Capabilities Through Evaluation of Sample Processing Methods**

7) **SUMMARY OF RESEARCH DURING TENURE** Itemize significant findings in concise form, utilizing key concepts/words.

- 1) Refined a Next Generation Sequencing Pipeline for single nucleotide polymorphisms (SNPs)
- 2) Designed and evaluated a panel of sequence capture probes for virus identification in a multiplex format
- 3) Managed the design and comprehensive testing of cell-based assays to measure in vitro cellular responses to infection
- 4)
- 5)

(USMA Davies Fellow: please add summary of teaching, including classes taught.)

8) **RESEARCH IN PROGRESS** Describe in no more than 100 words.

Our viral diagnostic capabilities rely on being able to recognize viral genetic variations. We need to have clear resolution on the single nucleotide polymorphisms (SNPs) present in a viral population, or quasispecies. Unfortunately, adding to the complexity of RNA virus populations are biases or variants introduced by the handful of laboratory processes performed on the sample. Understanding the effects of different sample manipulations is imperative when extracting a consensus sequence for the design of diagnostic assays. My research focuses on evaluating sample processing methods and determining which are best for determining the true variants in a sample.

9) **PUBLICATIONS AND PAPERS RESULTING FROM NRC ASSOCIATESHIP RESEARCH**

Provide complete citations: author(s), title, full name of journal, volume number, page number(s), and year of publication.

a) Publications in peer-reviewed journals

n/a

b) Books, book chapters, other publications

Kulesh DA, Stefan CP, Altamura L, Koehler JW, Huse VA, Minogue TD. (2015). Threat Characterization Consortium. Annual Report Prepared for The Defense Threat Reduction Agency (DTRA). December 2015.

c) Manuscripts in preparation, manuscripts submitted

Huse VA, Conrad T, Koehler JW, Graham A, Minogue TD. (2016) Improvement of Viral Diagnostic Capabilities Through Evaluation of Sample Processing Methods. In Preparation.

**10) PATENT OR COPYRIGHT APPLICATIONS RESULTING FROM NRC ASSOCIATESHIP RESEARCH**

**Provide titles, inventors, and dates of applications.**

n/a

**11) PRESENTATIONS AT SCIENTIFIC MEETINGS OR CONFERENCES**

**Provide complete references: author(s), title, abstract/proceeding citation, meeting name and location.**

**International**

n/a

**Domestic**

**Huse V. (2015). Targeted Next-Generation Sequencing for Identification and Phylogenetic Characterization of Chikungunya Virus. Oral presentation at: The National Interagency Confederation for Biological Research (NICBR), May 4; Fort Detrick, MD.**

**12) SEMINARS OR LECTURES DELIVERED AT UNIVERSITIES AND/OR INSTITUTES** **Include dates, names and locations of seminars.**

n/a

**13) PROFESSIONAL AWARDS RECEIVED DURING TENURE**

n/a

**14) POST-TENURE POSITION / JOB TITLE**

**Staff Fellow Review Microbiologist**

**15) NAME AND ADDRESS OF POST-TENURE POSITION / JOB ORGANIZATION**

**Food and Drug Administration**

**10903 New Hampshire Ave.,  
Silver Spring, MD 20993**

**16) POST-TENURE POSITION STATUS / CATEGORY** **Please indicate only one.**

<input type="checkbox"/> Permanent position at the host agency	<input type="checkbox"/> Research/administration position in private industry in the U.S.
<input type="checkbox"/> Contract or temporary position at the host Agency <b>Abbreviate Host Laboratory/Center</b> _____	<input type="checkbox"/> Research/administration position in private industry outside of the U.S.
<input checked="" type="checkbox"/> Research/Administrative position with another U.S.-government agency	<input type="checkbox"/> Research/administration position with a non profit
<input type="checkbox"/> Research/Administrative position with a foreign-government agency	<input type="checkbox"/> Self-employed/consulting
<input type="checkbox"/> Research/teaching position at a U.S. college or university	<input type="checkbox"/> Postdoctoral research
<input type="checkbox"/> Research/teaching position at a foreign college or university	<input type="checkbox"/> Other (Please specify, possible) _____
	<input type="checkbox"/> No information provided

**17) (For J-1 visa holders only) SUMMARY OF CULTURAL AND EDUCATIONAL EXCHANGE DURING TENURE** Itemize experiences that your laboratory (LPR and/or Adviser) has offered to you that facilitated your learning about American culture. Also itemize what you have done to share your culture with your colleagues and the community.

- 1)
- 2)
- 3)
- 4)
- 5)

**18) APPRAISAL OF NRC RESEARCH ASSOCIATESHIP PROGRAM**

**On a scale of 1 – 10 (poor - excellent), please rate the following:**

**SHORT TERM VALUE**

**9** Development of knowledge, skills, and research productivity  
**Comments**

**LONG TERM VALUE**

**2** How the NRC Research Associateship award affected your career to date  
**Comments**  
**I believe that having this award helped me acquire a permanent government position.**

#### LAB SUPPORT

**8** Quality of support from the Laboratory--equipment, funding, orientation, safety and health guidelines, etc.

##### **Comments**

**Wonderful laboratory, have everything we need. Unfortunately, getting in equipment, software or computers takes between 3 months to a year.**

#### ADVISER/MENTOR SUPPORT

**10** Quality of mentoring from the Laboratory Adviser (USMA Mentor, if applicable)

##### **Comments**

**Wonderful mentor. Very supportive and open to new ideas regarding research.**

#### LPR SUPPORT

**10** Quality of administrative support from the Laboratory Program Representative (LPR)

##### **Comments**

**Laboratory program representative was always responsive when we needed him.**

#### NRC RESEARCH ASSOCIATESHIP PROGRAMS SUPPORT

**9** Quality of administrative support. Please assess the support you received from the Fellowships Office (e.g., moving company, insurance, Omega, payroll, Program Coordinator, travel, etc.)

##### **Comments**

18) PLEASE PROVIDE ANY SUGGESTIONS FOR PROGRAM IMPROVEMENT.

**I previously worked for a non-profit and we had taxes taken out of our paychecks. Having this service would be extremely helpful and appreciated.**

**Please do NOT scan to PDF. Send the Final Report as MSWord document via e-mail to your Program Coordinator**

*No handwritten signature required;  
but you may upload a scanned  
signature file below:*

Leah Probst: [lprobst@nas.edu](mailto:lprobst@nas.edu)

Linda Sligh: [lsligh@nas.edu](mailto:lsligh@nas.edu)

Melanie Suydam: [msuydam@nas.edu](mailto:msuydam@nas.edu)

Peggy Wilson: [pwilson@nas.edu](mailto:pwilson@nas.edu)

**Id#**

**Rev. October 2015**

**Proj/Act ID#**

## NRC RESEARCH ASSOCIATESHIP PROGRAM ASSOCIATE FINAL REPORT

**Associate:** Shoemaker, Charles Jason  
**Program:** AMRMC - U.S. Army Medical Research & Materiel Command  
U.S. Army Medical Research Institute of Infectious Diseases  
US Army Medical Research Insti Infec Diseases  
Fort Detrick, MD 21702-5011  
**Opportunity:** B3460/Molecular Virology and Vaccine Development  
**Adviser:** Schmaljohn, Connie  
**Research Proposal:** A Nucleic Acid Vaccine Approach for In Vivo Generation of Filovirus Virus-Like Particles  
**Tenure Dates:** 02/03/2014-02/02/2017

### RESEARCH ACCOMPLISHMENTS

The most important scientific contributions I have made to date have concerned Crimean-Congo Hemorrhagic Fever Virus (CCHFV) research. This has involved developing diagnostic tools for evaluating humoral responses in animals infected by CCHFV or vaccinated with CCHFV glycoprotein antigen. These studies have relied primarily on utilization of a CCHFV VLP system to act as both a BSL-2 surrogate in neutralization assays, as well as serving as a capture antigen in various immunoassays (e.g. ELISA).

### SCHOLARLY PRODUCTIVITY

#### ARTICLES - PEER REVIEWED

Garrison, A., Shoemaker CJ, et al. (co-first author)., 2017, Crimean-Congo hemorrhagic fever virus DNA vaccine protects against lethal challenge in two mouse models. Manuscript in preparation.  
,  
Golden, J, Shoemaker CJ, et al. (second author)., 2017, Characterizing the role IFN-I plays in the control of Crimean-Congo hemorrhagic fever in mice. Manuscript in preparation.,  
Altamura, L., Shoemaker CJ, et al. (second author)., 2017, Development of a CCHFV Glycoprotein DNA Vaccine. Manuscript in preparation.,  
Tran EE, Nelson EA, Bonagiri P, Simmons JA, Shoemaker CJ, Schmaljohn CS, Kobinger GP, Zeitlin L, Subramaniam S, White JM., 2016, Mapping of Ebolavirus Neutralization by Monoclonal Antibodies in the ZMapp Cocktail Using Cryo-Electron Tomography and Studies of Cellular Entry., J Virol. 2016 Jun 8 pii: JVI.00406-16.

#### ARTICLES - OTHER (PROCEEDINGS, BOOK CHAPTERS, OTHER)

#### PRESENTATIONS - DOMESTIC

#### PRESENTATIONS - INTERNATIONAL

#### PATENTS

#### AWARDS

*The National Academies of*  
**SCIENCES • ENGINEERING • MEDICINE**

**NRC Research Associateship Programs**

**FINAL REPORT**

1) Associate Last or Family Name <b>Zeng</b>		First Name <b>Xiankun</b>	M.I.
2) FORWARDING Address (to which your tax statement will be mailed) <b>Residence or Institution USAMRIID</b> Street City, State Zip		FORWARDING Phone(s) and E-Mail (if known) Home Phone: Alt. Phone: Preferred E-mail:	
3) Today's Date <b>July 28, 2016</b>		Dates of Tenure from <b>May 4, 2015</b> to <b>July 31, 2016</b>	
4) Host Agency <b>AMRMC</b> (e.g., AFRL)	Laboratory or Center <b>USAMRIID</b> (e.g., Wright Patterson AFB)	Division / Directorate / Department <b>Pathology</b> (e.g., High-Speed Propulsion)	
5) Name of Laboratory Adviser (and USMA Mentor, if applicable) <b>Dr. Mei Sun</b>			

6) **TITLE OF RESEARCH PROPOSAL**

**Correlative Special Stains under Light and Scanning Electron**

7) **SUMMARY OF RESEARCH DURING TENURE** Itemize significant findings in concise form, utilizing key concepts/words.

- 1) Developed motorized *in situ* hybridization (MISH) technology to detect infectious agents (ongoing)
- 2) Developed a method to detect Ebola virus repliation by fluorescence *in situ* hybridization (manuscript in preparation)
- 3) Identification of persistent Ebola infection in non-human primate ( manuscript in preparation)
- 4)
- 5)

(USMA Davies Fellow: please add summary of teaching, including classes taught.)

8) **RESEARCH IN PROGRESS** Describe in no more than 100 words.

I have successfully developed Crispr/Cas9 mediated MISH method to detect DNA target in FFPE tissue. What I am going to do is to apply this method to detect emergent bacteria agents such as *Burkholderia pseudomallei* in cultured cells, blood, and FFPE tissue.

9) **PUBLICATIONS AND PAPERS RESULTING FROM NRC ASSOCIATESHIP RESEARCH**

Provide complete citations: author(s), title, full name of journal, volume number, page number(s), and year of publication.

a) Publications in peer-reviewed journals

**None**

b) Books, book chapters, other publications

**None**

c) Manuscripts in preparation, manuscripts submitted

**1. Zeng X\*, Schellhase C, Blancett C, Honnold S, Sun M. 2016 Detection of Ebola virus replication by fluorescence *in situ* hybridization (in preparation, \* correspondence).**

**2. Zeng X\*, Blancett C, Koistinen K, Schellhase C, Bearss J, Chance T, Honnold S, Sun M. 2016. Persistent Ebola infection in non-human primate (in preparation, \* correspondence)**

10) **PATENT OR COPYRIGHT APPLICATIONS RESULTING FROM NRC ASSOCIATESHIP RESEARCH**

Provide titles, inventors, and dates of applications.

**None**

**11) PRESENTATIONS AT SCIENTIFIC MEETINGS OR CONFERENCES**

Provide complete references: author(s), title, abstract/proceeding citation, meeting name and location.

**International**

**None**

**Domestic**

**None**

**12) SEMINARS OR LECTURES DELIVERED AT UNIVERSITIES AND/OR INSTITUTES** **Include dates, names and locations of seminars.**

**10/6/201, Molecular Detection of Infectious Agents, USAMRIID**

**13) PROFESSIONAL AWARDS RECEIVED DURING TENURE**

**None**

**14) POST-TENURE POSITION / JOB TITLE**

**Molecular Scientist**

**15) NAME AND ADDRESS OF POST-TENURE POSITION / JOB ORGANIZATION**

**16) POST-TENURE POSITION STATUS / CATEGORY** **Please indicate only one.**

<input type="checkbox"/> Permanent position at the host agency	<input type="checkbox"/> Research/administration position in private industry in the U.S.
<input type="checkbox"/> Contract or temporary position at the host Agency Abbreviate Host Laboratory/Center _____	<input type="checkbox"/> Research/administration position in private industry outside of the U.S.
<input checked="" type="checkbox"/> Research/Administrative position with another U.S.-government agency	<input type="checkbox"/> Research/administration position with a non profit
<input type="checkbox"/> Research/Administrative position with a foreign-government agency	<input type="checkbox"/> Self-employed/consulting
<input type="checkbox"/> Research/teaching position at a U.S. college or university	<input type="checkbox"/> Postdoctoral research
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**Please do NOT scan to PDF. Send the Final Report as MSWord document via e-mail to your Program Coordinator**

*No handwritten signature required;*

*but you may upload a scanned  
signature file below:*

Leah Probst: [lprobst@nas.edu](mailto:lprobst@nas.edu)

Linda Sligh: [lsligh@nas.edu](mailto:lsligh@nas.edu)

Melanie Suydam: [msuydam@nas.edu](mailto:msuydam@nas.edu)

Peggy Wilson: [pwilson@nas.edu](mailto:pwilson@nas.edu)

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